

A RENO-PERICARDIAC PORE IN *AMPULLARIA URCEUS*, MÜLL.

By R. H. BURNE, B.A.,

Assistant in the Museum of the Royal College of Surgeons of England.

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DR. VON ERLANGER, in the course of a criticism¹ of Bouvier's account of the renal organs of *Ampullaria*,² uses these words:—"It seems highly improbable to me that the lamellar renal organ should have no communication with the pericardium. . . . This point and the communication of the two renal organs ought certainly to be re-investigated in well-preserved specimens by the method of sections."

The following note, which is the result of the dissection of two specimens of *Ampullaria urceus*, Müll., and the examination of sections cut from fragments of another,³ responds to a certain extent to this expressed wish, although I should have been better satisfied if the material at my disposal for section-cutting had been slightly more abundant.

As regards the general anatomy of the renal organs, I may say at once that I have found Bouvier's description perfectly accurate, and hence need only abstract enough from his account to make my own addition intelligible.

The kidneys of *Ampullaria* (see Figure) are two in number. One, situated towards the right side of the body, close behind the portion of the gill that lies nearest the heart, is triangular in shape, with the base directed backwards to the left, and the apex forwards with an inclination to the right (*l.r.*). The interior of this triangular right kidney is occupied by a series of lamellæ disposed at right angles to its longer axis (hence the name "lamellar renal organ"); it communicates with the exterior by means of a large slit-like opening (*r.o.*), and with the second kidney by a much smaller one (*i.r.o.*), though even this exceeds 1 mm. in length. The second kidney is situated behind and to the left of the first, and is bounded in front by the pericardium. It is a capacious chamber, with no external outlet except through the right kidney; the roof (*v.r.*) is thick and extremely vascular, while the floor is so thin that the intestine (*int.*) and other organs covered by it appear to project freely into the renal cavity. Both kidneys are functional excretory organs, and each is

¹ Erlanger, "On the Paired Nephridia of Prosobranchs," etc.: *Quart. Journ. Micro. Sci.*, vol. xxxiii (1892), p. 608.

² Bouvier, "Étude sur l'Organisation des Ampullaires": *Mém. Soc. Philom.* (1888), p. 63*.

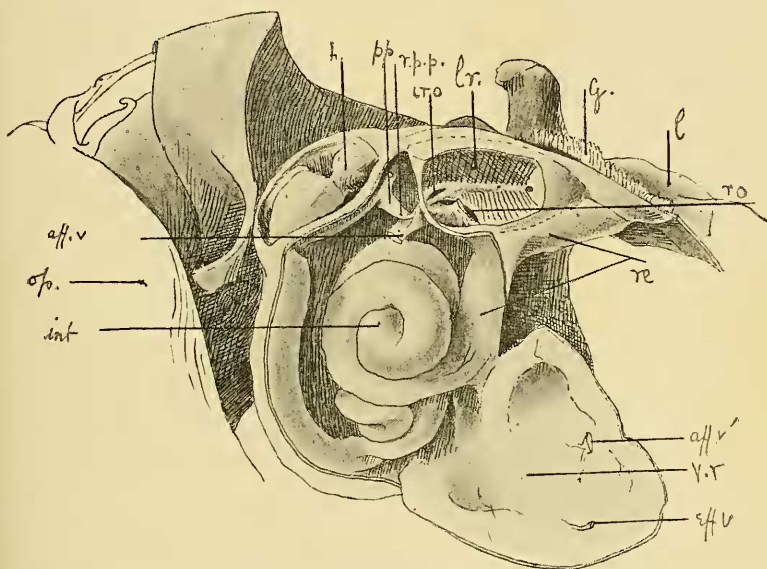
³ These specimens are the property of the Royal College of Surgeons. The dissection of the renal organs is No. 1,176, D, Phys. Series, in the Museum of that Institution.

provided with an independent system of circulation. Bouvier makes no mention of reno-pericardiac pores, although, as I will now show, a very conspicuous one is present. If, instead of reflecting the roof of the posterior or left kidney forwards, as done by Bouvier, we cut along its anterior and lateral margins and turn it backwards, a hollow finger-like process of the pericardium (*p.p.*), 1.5 mm. in length, will be seen projecting into the cavity of the kidney in the direction of the posterior corner of the lamellar organ. The process originates at a point between the right and middle thirds of the posterior wall of the pericardium, and its apex lies upon the main trunk of the afferent vessel (*aff.v.*) of the left kidney and vanishes towards the inter-renal opening. At the point where the pericardiac process meets the afferent vessel, its postero-dorsal wall is perforated by a small aperture with slightly thickened lips. This is the reno-pericardiac pore (*r.p.p.*). It is large enough to be plainly visible to the naked eye, and readily allows the passage of a fine hair from the pericardium into the left kidney. I was able to cut a series of sections of the pericardiac process transverse to its long axis, and observed that the pore was not situated at the extreme end of its cavity, but at a point slightly anterior thereto; after the obliteration of the cavity, the process is still to be traced upon the surface of the afferent vessel as a solid cord, which finally is continuous with one of the lips of the inter-renal opening.

With regard to the right kidney, I was unable to detect any communication between it and the pericardium, either by superficial examination of the walls of the pericardium or by means of sections. The latter I was only able to cut through the right anterior extremity of the pericardium, the point most nearly approximated to the right kidney. At this point there certainly was no pore, but with regard to the rest of the pericardiac wall, the most that I can say is, that no pore was apparent on superficial examination, and furthermore that the distance of these parts of the pericardium from the right kidney would render a direct communication between them well-nigh impossible.

In speaking of these two kidneys as left and right respectively, I have, merely for convenience sake, followed the description given by Bouvier based upon their general relations to each other and to the body. Whether Bouvier was really justified in regarding the triangular kidney as the right and the other as the left, homologous respectively to the right and left kidneys of the Diotocards, appears to be open to question. At least Erlanger, who, from considerations of comparative anatomy and embryology, holds the simple kidney of the Monotocards to be homologous to the left kidney of the Dioto- and Heterocards, concludes, from a comparison of *Ampullaria* with *Paludina* and *Bythinia*, that the lamellar kidney is the left, and thus the representative of the single kidney in other Monotocards, while the large, highly vascular kidney is the right; and he is further led, in consequence of his discovery that when a reno-pericardiac pore is present at all in the Dioto- and Heterocards it is present in the left kidney only, to prophesy that a pore would be found between

the lamellar kidney of *Ampullaria* and the pericardium. This surmise, as we have seen, is not borne out by the facts, so we must consider, I suppose, on Erlanger's hypothesis, that the vascular and not the lamellar kidney is the left, corresponding to the left kidney of Diotocard and Heterocards and to the only remaining kidney of Monotocards—thus restoring Bouvier's original arrangement. But since this view is opposed by the close similarity of structure between the lamellar kidney of *Ampullaria* and the only kidney of *Bythinia*, we should do well to pause before accepting it on the strength of the pore alone, and more especially when we observe the peculiar position of the pore. The pore, as already shown, is situated, not, as one



Dissection of *Ampullaria urceus*.—The mantle has been reflected to the right, and the renal organs and pericardium have been opened.

aff.v. cut end of afferent vessel of posterior kidney. *aff.v'* the corresponding vessel in the reflected roof of the kidney. *eff.v.* the efferent vessel of posterior kidney. *g.* gill. *h.* heart within the pericardium. *int.* coils of intestine protruding into cavity of posterior kidney. *i.r.o.* inter-renal opening. *l.* lung reflected to the right. *l.r.* lamellar renal organ. *op.* operculum. *p.p.* pericardiac process. *re.* rectum. *r.o.* opening from lamellar organ to exterior. *r.p.p.* reno-pericardiac pore. *v.r.* vascular roof of posterior kidney reflected backwards.

would expect, in the flat partition-wall between the kidney and the pericardium, but towards the apex of a curious figure-like process of the latter, that stretches across the cavity of the large vascular kidney, and loses itself, after assuming the form of a solid cord, on the margin of the inter-renal opening. Does not this dragging of

the pericardium towards the lamellar kidney, first as a tube, then as a solid cylinder, strongly suggest that the relation of the lamellar kidney to the pericardium may at some time have been more intimate than it is at present? May not, for instance, the reno-pericardiac pore have been originally situated in the lamellar kidney on a long diverticulum of the pericardium, and subsequently have undergone migration into the vascular kidney, accompanied by atrophy of the distal portion of the pericardiac process? Or, perhaps, there may have been two reno-pericardiac pores, one to each kidney, situated on a common pericardiac diverticulum, of which that belonging to the lamellar kidney has since been lost. However, apart from what may, or may not, have been the case formerly, the present features of the pore are sufficiently peculiar to warn one to be cautious in assigning too great weight to it in any attempt to determine which kidney of *Ampullaria* is the representative of the single kidney of other Monotocards.